

**PATENT COOPERATION TREATY**  
**PCT**  
**INTERNATIONAL PRELIMINARY EXAMINATION REPORT**  
(PCT Article 36 and Rule 70)

REC'D 20 APR 2001

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Applicant's or agent's file reference 16304	<b>FOR FURTHER ACTION</b>	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).
International application No. <b>PCT/AU 00/01163</b>	International filing date (day/month/year) 25 September 2000	Priority Date (day/month/year) 23 September 1999
International Patent Classification (IPC) or national classification and IPC <b>Int. Cl.<sup>7</sup> B60R 1/062, F16F 7/10</b>		
Applicant <b>BRITAX RAINSFORDS PTY LTD (et al.)</b>		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheet(s).

3. This report contains indications relating to the following items:

- |      |                                     |   |
|------|-------------------------------------|---|
| I    | <input checked="" type="checkbox"/> | Basis of the report   |
| II   | <input type="checkbox"/>            | Priority  |
| III  | <input type="checkbox"/>            | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability  |
| IV   | <input type="checkbox"/>            | Lack of unity of invention  |
| V    | <input checked="" type="checkbox"/> | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| VI   | <input type="checkbox"/>            | Certain documents cited   |
| VII  | <input type="checkbox"/>            | Certain defects in the international application  |
| VIII | <input type="checkbox"/>            | Certain observations on the international application   |

Date of submission of the demand 23 March 2001	Date of completion of the report 02 April 2001
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200 WODEN ACT 2606 AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer  B. NGUYEN Telephone No. (02) 6283 2306

**I. Basis of the report****1. With regard to the elements of the international application:\***

- ☒ the international application as originally filed.
- ☐ the description,      pages      , as originally filed,  
                                 pages      , filed with the demand,  
                                 pages      , received on      with the letter of      .
- ☐ the claims,      pages      , as originally filed,  
                                 pages      , as amended (together with any statement) under Article 19,  
                                 pages      , filed with the demand,  
                                 pages      , received on      with the letter of      .
- ☐ the drawings,      pages      , as originally filed,  
                                 pages      , filed with the demand,  
                                 pages      , received on      with the letter of      .
- ☐ the sequence listing part of the description:  
                                 pages      , as originally filed  
                                 pages      , filed with the demand  
                                 pages      , received on      with the letter of      .

**2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.**

These elements were available or furnished to this Authority in the following language      which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

**3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, was on the basis of the sequence listing:**

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

**4. ☐ The amendments have resulted in the cancellation of:**

- ☐ the description,      pages
- ☐ the claims,      Nos.
- ☐ the drawings,      sheets/fig

**5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\***

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Claims 1 - 30	YES
	Claims	NO
Inventive step (IS)	Claims 1 - 30	YES
	Claims	NO
Industrial applicability (IA)	Claims 1 - 30	YES
	Claims	NO

**2. Citations and explanations (Rule 70.7)**

All the patent documents cited in the ISR were category A only. Therefore the claimed invention is not disclosed in any of these patent documents and hence all claims are novel.

The claimed invention is not obvious in the light of any of the cited documents nor disclosed in any obvious combination, nor would the claimed invention be obvious to a person skilled in the art in the light of common general knowledge by itself or in combination with any of these documents.

Hence these claims meet the requirement of novelty and inventive step.  
These claims are also industrially applicable.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



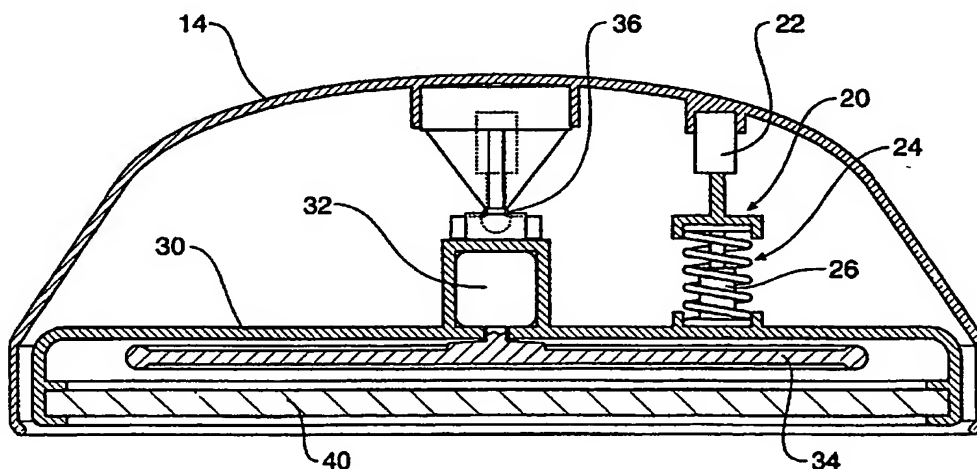
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**WO 01/21439 A1**

- (51) International Patent Classification<sup>7</sup>: **B60R 1/062**, F16F 7/10 (74) Agent: **MADDERNS**; Level 1, 64 Hindmarsh Square, Adelaide, S.A. 5000 (AU).
- (21) International Application Number: **PCT/AU00/01163** (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
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PQ 3020 23 September 1999 (23.09.1999) AU
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(75) Inventor/Applicant (*for US only*): **GILBERT, Robert, William** [AU/AU]; Sherriffs Road, Lonsdale, S.A. 5160 (AU).
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- Published:  
— With international search report.
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: **VIBRATION SUPPRESSED VEHICLE MIRROR**



(57) Abstract: A vehicle external rear vision mirror assembly comprising: a support arm; a mirror frame (14) mounted on an end of the support arm; a support portion (30) connected to the mirror frame (14); a flywheel (34) rotatably mounted with respect to the support portion (30); a means for rotating the flywheel (34); a mirror (40) mounted to the support portion (30), the mirror (40) having a reflective surface orientated substantially normal to the rotational axis of the flywheel (34); and a connection means connecting the support portion (30) to the mirror frame (14), the connection means arranged and constructed such that the angle of the support portion (30), with respect to the mirror frame (14), can be adjusted, whereby the flywheel (34) stabilises the mirror (40) against tilting vibrational movement. The mirror (40) may be mounted either to the support portion (30) (and therefore non-rotatable) or may be mounted directly to the flywheel (34).

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**VIBRATION SUPPRESSED VEHICLE MIRROR**

The present invention relates to vehicle mounted mirrors, and in particular to vehicle rear vision mirrors mounted external to the vehicle cabin.

**BACKGROUND**

With any vehicle mirror, it is important to stabilise the position of the reflective mirror surface providing the rear view with respect to either the vehicle or with respect to the driver. Vibration causing rotational movement of the reflective mirror surface can present a moving or fuzzy rear view image to the vehicle driver. Sources of vibration include the vehicle's engine and small scale vertical vehicle movement caused by the road surface.

In order to provide rear vision to the side of a vehicle, many vehicles have mirrors mounted external to their cabin. Such mirrors either provide an alternative rear view to an internally mounted mirror or, in the case of many trucks, provide the only rear view.

Stabilisation of externally mounted mirrors is more difficult than stabilisation of internally mounted mirrors for a number of reasons. Externally mounted mirror housings are subject to additional forces (for example aerodynamic forces) and are often more complex in their design. For instance, external mirrors often require an ability to break away upon impact with a pedestrian and therefore have pivots and detent mechanisms between a vehicle body and the mirror surface. External mirrors often have motor drive systems for remote adjustment of their position and heating equipment to prevent fogging and/or icing. These additional systems add weight. Heavier mirror housings have greater inertia and therefore are more difficult to attach to the vehicle in a way that ensures they do not vibrate with respect to the vehicle. Generally heavier mirrors are supported by larger and stiffer cantilevered arms. This adds to the cost of the vehicle and can detract from the appearance of the vehicle.

It is an object of the present invention to provide a vehicle mirror assembly that stabilises a mirror reflective surface against tilting vibration and thereby overcomes at least some of the aforementioned problems.

#### SUMMARY OF THE INVENTION

According to the invention there is provided a vehicle mirror assembly comprising:

- a mirror frame;
- a rotor rotatably mounted with respect to the mirror frame;
- a means for rotating the rotor with respect to the mirror frame;
- a connection means operably interposed between the rotor and the mirror frame allowing pivoting of the rotor with respect to the mirror frame; and
- a mirror, having a reflective surface, mounted with respect to the rotor so that the surface remains substantially parallel to the plane in which the rotor rotates, whereby the rotor stabilises the mirror against tilting vibrational movement.

Preferably the connection means is arranged and constructed such that the angle of the mirror surface, with respect to the mirror frame, can be adjusted.

Preferably the vehicle mirror assembly comprises a support portion interposed between the mirror frame and the rotor, the support portion supporting the rotor.

The mirror may be mounted either to the support portion (and therefore non-rotatable) or may be mounted directly to the rotor.

Preferably the connection means comprises:

- a pivot mounting interposed between the mirror frame and the support portion; and

at least two legs operably interposed between the mirror frame and the support portion, each leg comprising an actuator for adjusting the no-load length of the leg and a vibration absorber connected in series to the actuator,

wherein the actuator enables adjustment of the timed-averaged orientation of the mirror with respect to the mirror frame and the vibration absorbers reduce the transmission of vibration forces from the mirror frame to the support portion.

The connection means, connecting the support portion (and hence rotor) to the mirror frame, ensures that the mirror will not follow high frequency tilting movements of the mirror frame. At the same time the connection means will ensure that the rotor stabilised mirror will generally remain in the same angular orientation with respect to the vehicle to which the mirror frame is attached.

Preferably the rotor is a substantially disc-shaped flywheel having a diameter of at least two thirds of the smallest bisector of the mirror surface.

According to a first aspect of the invention, the means for rotating the rotor is preferably air driven.

According to a second aspect of the invention, the means for rotating the rotor preferably comprises an electric motor.

The mirror frame preferably comprises a mirror case that substantially encapsulates the support portion, rotor and mirror from behind the mirror surface.

Specific embodiments of the invention will now be described in some further detail with reference to and as illustrated in the accompanying figures. These embodiments are illustrative, and are not meant to be restrictive of the scope of the invention.

## DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

Preferred embodiments of the invention are illustrated in the accompanying representations in which:

Fig 1 shows a rear view of the mirror assembly according to a first embodiment of the invention; and

Fig 2 shows a cross sectional view of the mirror assembly of Fig 1 through the plane 2-2 as indicated on Fig 1.

Fig 3 shows a rear view of a mirror assembly according to a second embodiment of the invention.

Fig 4 shows a cross section view of the mirror assembly of Fig 3 through the plane 4-4 as indicated on Fig 3.

Fig 5 shows a rear view of a mirror assembly according to a third embodiment of the invention.

Fig 6 shows a front perspective view of the mirror assembly of Fig 5.

Referring to Figs 1 and 2, a vehicle mirror assembly 10 is shown for mounting external to a vehicle. In this first embodiment of the invention the vehicle mirror assembly 10 comprises a support arm 12 for connection to a vehicle, a mirror frame in the form of a mirror case 14 and a rotor stabilised mirror 40. The rotor is in the form of a flywheel 34, although other rotor shapes could be used. A support portion 30 is provided to support the flywheel 34 and the mirror 40. A motor 32 is housed within the support portion 30. Motor 32 rotates flywheel 34 to create a gyroscope that has the effect of stabilising the mirror 40 and in particular preventing tilting vibrational movement being transmitted from the mirror frame (case) 14 to the mirror 40. This



arrangement allows support arm 12 to be relatively small and less stiff than would otherwise be required to prevent tilting vibration of the mirror 40.

Interposed between the support portion 30 and the mirror case 14 is a connection means in the form of a pivot mounting 36 and two legs 20 and 60. Pivot mounting 36 allows pivoting of the flywheel and mirror with respect to the mirror case 14.

Pivoting of the mirror 40 with respect to the mirror case 14 is controlled by legs 20 and 60. Each of these legs includes an actuator 22 for adjusting the no-load length of the leg and a vibration absorber in the form of a spring 24 and a damper 26 connected in series to the actuator 22. The vibration absorbers reduce the transmission of vibration from the mirror case 14 to the support portion 30 (and therefore the mirror 40).

The above-described connection means, connecting the support portion 30 (and hence flywheel 34) to the mirror frame (case) 14, ensures that the mirror 40 will not follow high frequency tilting movements of the mirror case 14. At the same time the connection means ensures that the flywheel stabilised mirror 40 will generally remain in the same angular orientation with respect to the vehicle to which the mirror case 14 is mounted. It also enables the rear view provided by the mirror 40 to be adjusted to suit the vehicle driver.

A second embodiment of the invention is shown in Figs 3 and 4. In this embodiment of the invention the mirror 40 is mounted directly to the flywheel 34 (rather than on the support portion 30). With this embodiment of the invention the mirror itself rotates. This arrangement has the advantage that water droplets are less likely to adhere to the mirror surface. In a variation of this embodiment, the flywheel 34 is eccentrically mounted so that its rotation causes lateral vibration. This lateral vibration further reduces the adhesion of water droplets to the mirror surface.

## 6

Fig 5 shows a third embodiment of the invention having two additional features. A second non-rotating and non-flywheel stabilised mirror 50 is provided. This mirror optionally may be a concave mirror for showing a wide rear view to the vehicle driver. Actuators may be positioned to ensure adjustment of the angle of mirror 50. The primary mirror 40 is mounted to a flywheel, as described in the second embodiment of the invention, and therefore is vibration stabilised and repels water from its surface.

Fig 6 is a rear perspective view of the third embodiment of the invention shown in Fig 5. In this third embodiment of the invention, the flywheel is air driven instead of motor driven. Air enters the mirror casing 14 through the entrance 17 of a duct 16 and then passes vanes 35 before exiting the mirror case 14 through its rear. This air movement imparts rotation to the flywheel. Various other air driven means for rotating the flywheel may be used.

Motor drive 32 may take various forms. For instance the motor's rotor itself may provide the rotational inertia required to produce the desired stabilisation.

Various types of rotors or flywheels may be employed to provide stability to the mirror based on the gyroscopic effect they produce.

While the present invention has been described in terms of preferred embodiments in order to facilitate better understanding of the invention, it should be appreciated that various modifications can be made without departing from the principles of the invention. Therefore the invention should be understood to include all such modifications within its scope.

## THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A vehicle mirror assembly comprising:
  - a mirror frame;
  - a rotor rotatably mounted with respect to the mirror frame;
  - a means for rotating the rotor with respect to the mirror frame;
  - a connection means operably interposed between the rotor and the mirror frame allowing pivoting of the rotor with respect to the mirror frame; and
  - a mirror, having a reflective surface, mounted with respect to the rotor so that the surface remains substantially parallel to the plane in which the rotor rotates, whereby the rotor stabilises the mirror against tilting vibrational movement.
2. A vehicle mirror assembly as claimed in claim 1, wherein the connection means is arranged and constructed such that the angle of the mirror surface, with respect to the mirror frame, can be adjusted.
3. A vehicle mirror assembly as claimed in claim 2 comprising a support portion interposed between the mirror frame and the rotor, the support portion supporting the rotor.
4. A vehicle mirror assembly as claimed in claim 3, wherein the connection means comprises:
  - a pivot mounting interposed between the mirror frame and the support portion; and
  - at least two legs operably interposed between the mirror frame and the support portion, each leg comprising an actuator for adjusting the no-load length of the leg and a vibration absorber connected in series to the actuator, wherein the actuator enables adjustment of the timed-averaged orientation of the mirror with respect to the mirror frame and the vibration absorbers reduce the transmission of vibration forces from the mirror frame to the support portion.

5. A vehicle mirror assembly as claimed in claim 4, wherein the vibration absorbers each comprises a spring means and a damper means operable in parallel.
6. A vehicle mirror assembly as claimed in any one of claims 1 to 5, wherein the rotor is a substantially disc-shaped flywheel.
7. A vehicle mirror assembly as claimed in claim 6, wherein the flywheel has a diameter of at least two thirds of the smallest bisector of the mirror surface.
8. A vehicle mirror assembly as claimed in any one of claims 1 to 7, wherein the means for rotating the rotor is air driven.
9. A vehicle mirror assembly as claimed in claim 8, wherein the means for rotating comprises vanes mounted to the rotor and an air passage arranged and constructed so as to direct air through the vanes.
10. A vehicle mirror assembly as claimed in any one of claims 1 to 7, wherein the means for rotating the rotor comprises an electric motor.
11. A vehicle mirror assembly as claimed in any one of claims 1 to 10, wherein the mirror frame comprises a case substantially encapsulating the support portion, rotor and mirror from behind the mirror surface.
12. A vehicle external rear vision mirror assembly comprising:
  - a support arm having a proximal and a distal end, the distal end for attaching to a vehicle;
  - a mirror frame mounted on or integral with the proximal end of the support arm;
  - a support portion connected to the mirror frame;

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a rotor rotatably mounted with respect to the support portion;  
a means for rotating the rotor;  
a mirror mounted to the support portion, the mirror having a reflective surface orientated substantially normal to the rotational axis of the rotor; and  
a connection means connecting the support portion to the mirror frame, the connection means arranged and constructed such that the angle of the support portion, with respect to the mirror frame, can be adjusted,  
whereby the rotor stabilises the mirror against tilting vibrational movement.

13. A mirror assembly as claimed in claim 12 wherein the connection means comprises:

a pivot mounting interposed between the mirror frame and the support portion; and

at least two legs operably interposed between the mirror frame and the support portion, each leg comprising an actuator for adjusting the no-load length of the leg and a vibration absorber connected in series to the actuator,

wherein the actuator enables adjustment of the time-averaged orientation of the mirror with respect to the mirror frame and the vibration absorbers reduce the transmission of vibration forces from the mirror frame to the support portion.

14. A mirror assembly as claimed in claim 13 wherein the vibration absorbers each comprises a spring means and a damper means operable in parallel.

15. A mirror assembly as claimed in any one of claims 12 to 14, wherein the rotor is a substantially disc shaped flywheel.

16. A vehicle mirror assembly as claimed in claim 15, wherein the flywheel has a diameter of at least two thirds of the smallest bisector of the mirror surface.

17. A vehicle mirror assembly as claimed in any one of claims 12 to 16, wherein the means for rotating the rotor is air driven.
18. A vehicle mirror assembly as claimed in claim 17, wherein the means for rotating comprises vanes mounted to the rotor and an air passage arranged and constructed so as to direct air through the vanes.
19. A vehicle mirror assembly as claimed in any one of claims 12 to 16, wherein the means for rotating the rotor comprises an electric motor.
20. A vehicle mirror assembly as claimed in any one of claims 12 to 19, wherein the mirror frame comprises a case substantially encapsulating the support portion, rotor and mirror from behind the mirror surface.
21. A vehicle external rear vision mirror assembly comprising:
- a support arm having a proximal and a distal end, the distal end for attaching to a vehicle;
  - a mirror frame mounted on or integral with the proximal end of the support arm;
  - a support portion connected to the mirror frame;
  - a rotor rotatably mounted with respect to the support portion;
  - a means for rotating the rotor;
  - a mirror mounted directly to, or integral with the rotor, the mirror having a reflective surface orientated substantially normal to the rotational axis of the rotor;
- and
- a connection means connecting the support portion to the mirror frame, the connection means arranged and constructed such that the angle of the support portion, with respect to the mirror frame, can be adjusted,
- whereby the rotor stabilises the mirror against tilting vibrational movement.

22. A mirror assembly as claimed in claim 21 wherein the connection means comprises:

a pivot mounting interposed between the mirror frame and the support portion; and

at least two legs operably interposed between the mirror frame and the support portion, each leg comprising a actuator for adjusting the no-load length of the leg and a vibration absorber connected in series to the actuator,

wherein the actuator enables adjustment of the time-averaged orientation of the mirror with respect to the mirror frame and the vibration absorbers reduce the transmission of vibration forces from the mirror frame to the support portion.

23. A mirror assembly as claimed in claim 22 wherein the vibration absorbers each comprises a spring means and a damper means operable in parallel.

24. A mirror assembly as claimed in any one of claims 20 to 23 wherein the rotor is a substantially disc shaped flywheel.

25. A vehicle mirror assembly as claimed in claim 24, wherein the flywheel has a diameter of at least two thirds of the smallest bisector of the mirror surface.

26. A vehicle mirror assembly as claimed in any one of claims 20 to 25, wherein the means for rotating the rotor is air driven.

27. A vehicle mirror assembly as claimed in claim 26, wherein the means for rotating comprises vanes mounted to the rotor and an air passage arranged and constructed so as to direct air through the vanes.

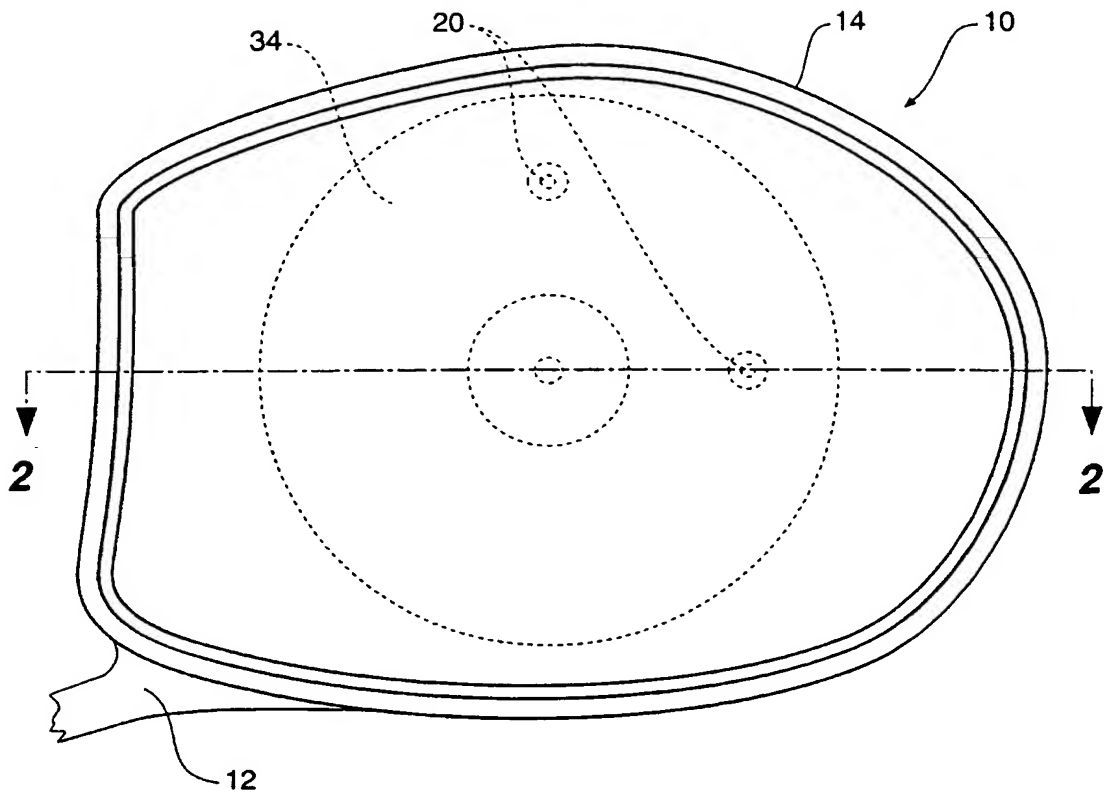
28. A vehicle mirror assembly as claimed in any one of claims 20 to 25, wherein the means for rotating the rotor comprises an electric motor.

29. A vehicle mirror assembly as claimed in any one of claims 20 to 28, wherein the mirror frame comprises a case substantially encapsulating the support portion, rotor and mirror from behind the mirror surface.

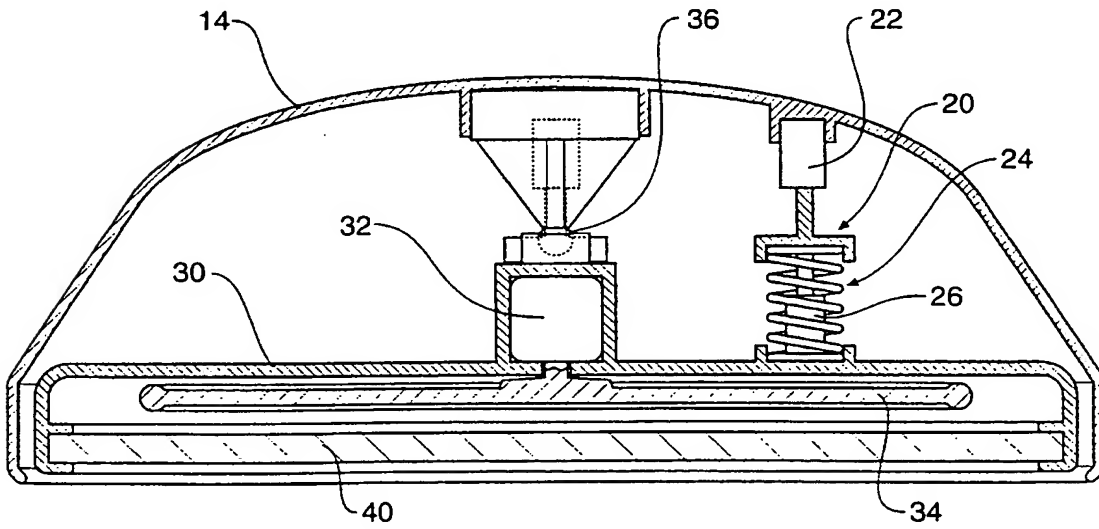
30. A mirror assembly as claimed in any one of claims 21 to 29 wherein the rotor is eccentrically mounted so that its rotation causes lateral vibration,  
whereby the vibration reduced the adhesion of water droplets to the mirror surface.



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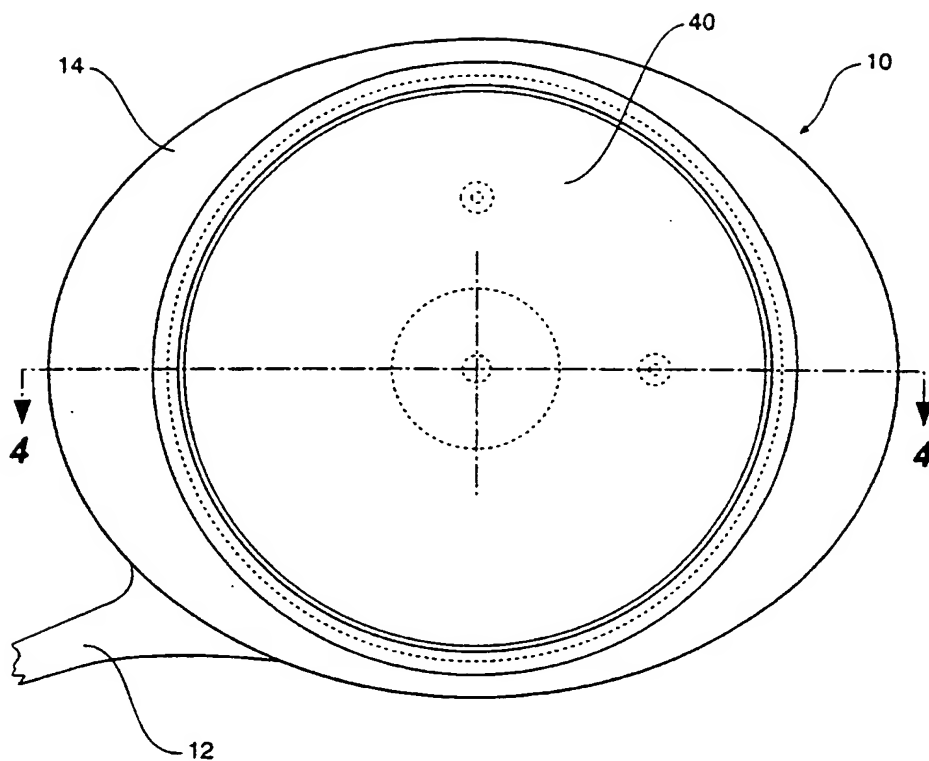


**Fig 1**

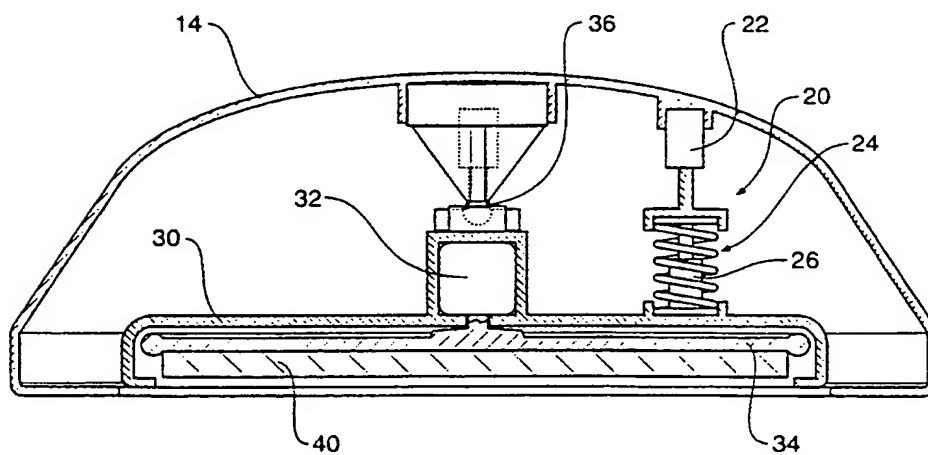


**Fig 2**

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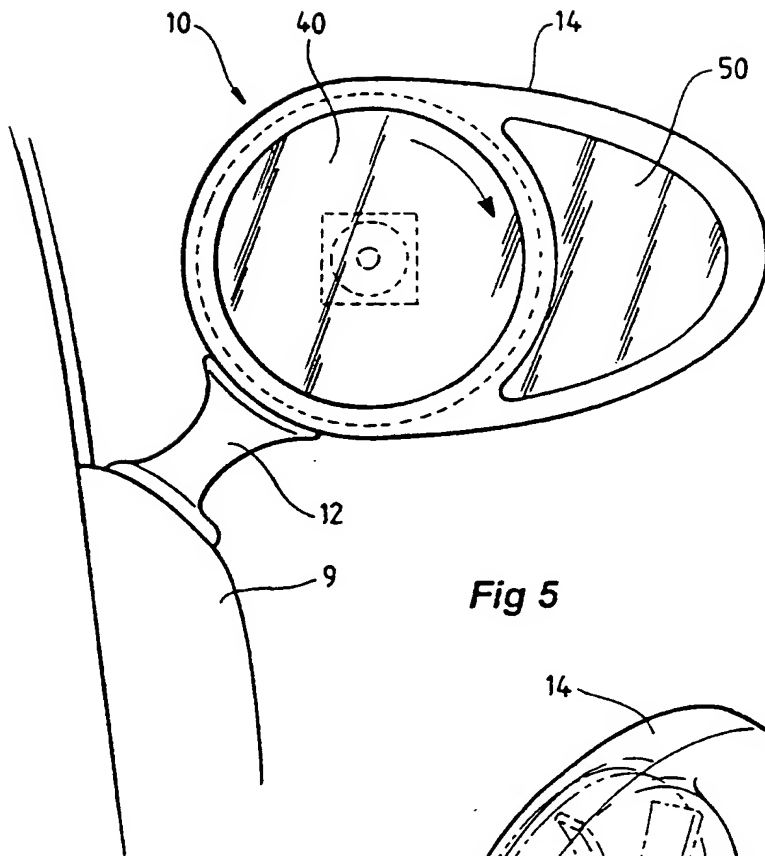


**Fig 3**

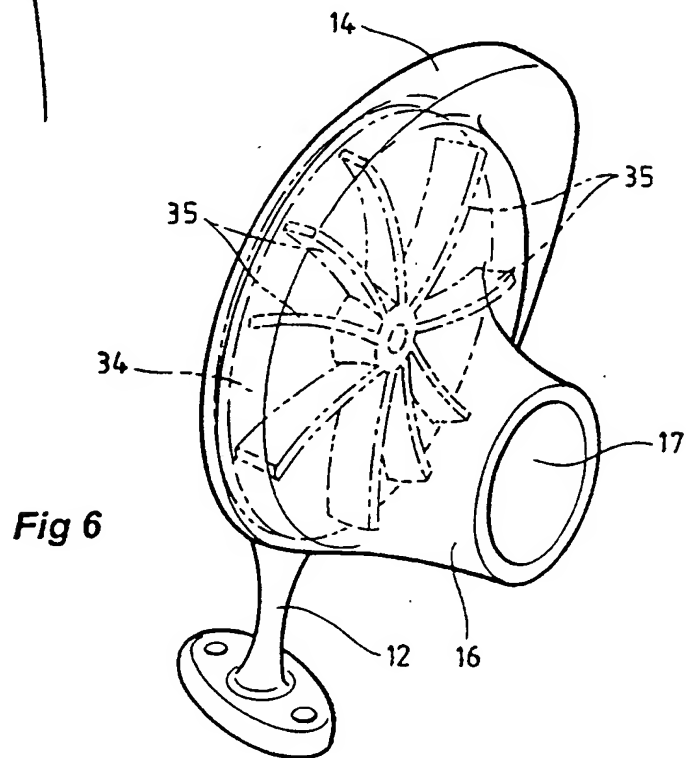


**Fig 4**

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**Fig 5**



**Fig 6**

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/AU 00/01163

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
Int Cl <sup>7</sup> : B60R 1/062, F16F 7/10		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols) IPC B60R 1/062, F16F 7/10		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU : IPC as above		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) DWPI		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4,705,368 A (MANZONI) 10 November 1987	1-30
A	US 5,721,639 A (AOSHIMA) 24 February 1998	1-30
A	US 3,609,014 A (KURZ, Jr.) 28 September 1971	1-30
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex		
<p>* Special categories of cited documents:</p> <p>"A" Document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p>		
Date of the actual completion of the international search 30 October 2000		Date of mailing of the international search report 13 NOV 2000
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200 WODEN ACT 2606 AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No.: (02) 6285 3929		Authorized officer  B. NGUYEN Telephone No.: (02) 6283 2306

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/AU 00/01163

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A,P	GB 2 340 804 A (SIMPSON) 1 March 2000	1-30

### Information on patent family members

PCT/AU 00/01163

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
US	4705368	EP	192549	FR	2577867		
US	5721639	DE	19613571	GB	9607145	GB	2299560
		JP	8276824				
US	3609014						
GB	2340804	GB	9817964				